Center Innovation Fund: JPL CIF

Four Thruster Microfluidic Electrospray Propulsion (MEP) Cubesat Board Demonstration

Completed Technology Project (2012 - 2013)

Project Introduction

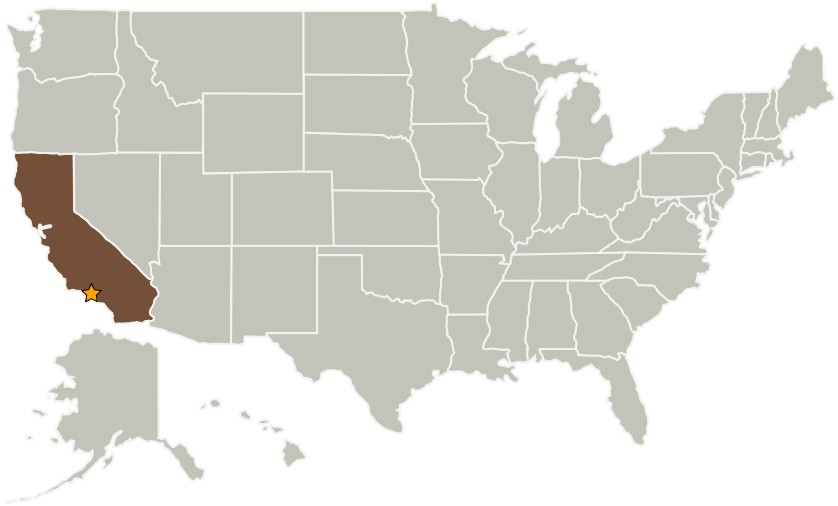
A cubesat Microfluidic Electrospray Propulsion (MEP) system module prototype will be designed, built and demonstrated. This system is under development to deliver >1000 m/s of delta-V to a three unit cubesat with less than 80 grams of solid indium propellant. It will include 4 prototype MEP thrusters and a power processing unit with a dry mass less than 100 grams.

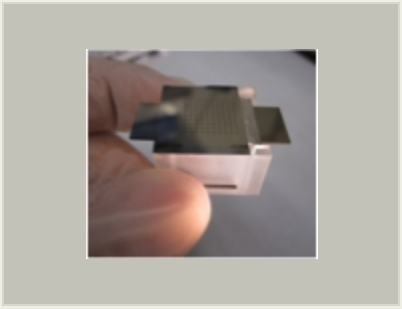
The Cubesat Microfluidic Electrospray Propulsion (MEP) system module prototype will be designed, built and tested to demonstrate that a four MEP thruster system can be integrated into a single module on a cubesat electronic board. The MEP thruster is shown in Figure 1. It is an electrospray thruster with microfabricated components, a highly integrated capillary force driven feed system and indium propellant that is stored as a solid metal in the thruster head. It has no valves or pressurized reservoirs. Four of these thrusters will plug into one side of the cubesat board with the Power processing Unit (PPU) on the opposite side. The PPU will consist of COTS components. It will be designed to operate four 100 micronewton MEP thrusters. Existing lower thrust prototype MEP thrusters will be demonstrated in the module. The performance of the system will be characterized and control of the module will be demonstrated in a vacuum environment.

Anticipated Benefits

This technology is not mature enough to impact funded missions.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Images

98.jpg
Project Image Four Thruster Microfluidic Electrospray Propulsion (MEP) Cubesat Board Demonstration
(https://techport.nasa.gov/image/1183)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Center / Facility:
Jet Propulsion Laboratory (JPL)

Responsible Program:
Center Innovation Fund: JPL CIF

Project Management

Program Director:
Michael R Lapointe

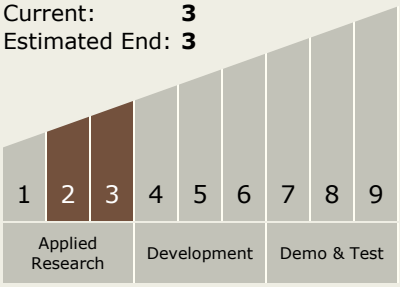
Program Manager:
Fred Y Hadaegh

Project Manager:
Jonas Zmuidzinas

Principal Investigator:
Colleen Marrese-reading

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic